

Mr. John Dannreuther
868 Mt. Moriah, Suite 202
Memphis, TN 38117

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Dear JD:

You have raised a fascinating challenge as to how the dentils were cut into the dies for early U.S. coins. You have pointed out that the dentils are of different width, different length, have different space between them, are often joined or touching, etc. The dentils seem to have no repeated sequence of the same characteristics. These are all very slight differences and seem to improve more uniformly into the 18th century. You have pointed out that a variety of the 1795 US eagle has a few inwardly pointed radial extensions from the center of certain dentils.

I am not aware of any description in a reference book or article as to how dentils are applied to the dies in the late 18th century or early 19th century in America or England. Many methods were deliberately kept secret. The US Mint had no steam power and relied on other means.

I do not know now if the dentils on such coin are flat on their tops or curved or sloping in any direction as this will require study under extensive magnification. I have given thought to how dentils were cut into the die face. I pretended I was the then diemaker. I submit two possibilities to you.

Method One Possibility

A soft steel die with a flat face might be held by its stem in a chuck or other holder so that its face could be worked on and so that it could be rotated on its center axis a degree or two accurately and locked in its position. A cutter to some extent like a circular saw blade could be separately mounted on a shaft so that the cutter blade would rotate vertically to the die face and placed so that its cut would be radial to the die on the outside border of the die. The cutter blade would be rotated on its shaft to make cuts. It could be advanced slowly toward the die by using a screw turn or handle. (In the alternate the die could be moved forward toward the blade but because it rotates that would be difficult.) This would cut a dentil one at a time before a position change for the next dentil cut by the blade.

The blade could have one or several cutters on it. They would be as thin as a dentil in width. They could be inserts in the blade holder or produced by notching while soft and then hardened before use.

Only one dentil would be cut at a time with the cutter advancing toward the center point of the die. Each dentil would be slightly different from the next due to the particular tooth order, for the first contact the position adjustment could determine how far in the tooth cutter went in the die. When the dentils are all cut into the die the die would be ready for the central design etc.

Method Two Possibility

Dentils could be produced by a method using some of the Castaing Machine principles. A punch for one dentil or for a few dentils could be hammered parallel along a straight steel strip, somewhat in position of the white keys on a piano. The strip would then be hardened, the edge of a circular soft steel disc would be rolled vertically under its axle pressure along the straight piano keys strip of dentils. The edge would pick up the dentil markings. The roller piece would then be hardened and look something like a reeded edge of a coin. This is similar to Castaing principle that a straight strip is transferring the design to the edge of the circular roller. Then a soft die with its face upright and able to rotate on its axis would be impressed vertically by the roller with the design under pressure near the outside perimeter of the die. The roller would press into and turn the die while transferring the dentil design onto the die. The dentils would all be in radial position due to the rotating motion of both pieces. The diameter of the roller could be its same as the diameter of the die but that may not be essential. When each dentil was formed it would not be marred as the two surfaces separate in two directions as they turn together.

Further Comment

Both methods are tedious and would have to be careful extensive and constant adjustments. Parts may have to be cleaned, filed, tightened, lubricated, annealed,

hardened etc. I am not going to address the problem of the spacing of the dentils so they come out without a fraction of a dentil as this can be solved by adjusting or changing the rotation settings or otherwise.

Either method could cause the spiked extensions on the 1795 eagle dentils. The curved end of the dentil may be caused by the cutter tooth shape or by the original punch.

Any clarification of this report will be made as promptly as I can. Any challenges or changes or improvements in logic are welcome.

Give me your thoughts so I can sleep at night otherwise I would not be able to turn off my noodle until the answer is found. The **** accomplished it so we can.

Your "nonogenerian" friend,

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